How your gut bacteria govern your health – and how you can change them for the better

Trust Me, I'm a Doctor's Dr Saleyha Ahsan talks to Dr Eran Elinav, one of the researchers in a study of 1000 people in Israel which is revolutionising our understanding of the role of gut bacteria in our health.

Dr Eran Elinav: This is a very young field, because we just realised in the last few years that our microbes, that live within us from the moment we are born, are extremely important in almost every aspect of our being.

Dr Saleyha Ahsan: Is it almost like our fingerprint? As individual as that?

Dr Eran Elinav: Absolutely, and the deeper we sequence, the deeper we characterise our gut microbes, we find that each and every one of us is unique in our microbiome composition and our microbial function. We now understand that our microbes are an integral part of our body – even a neglected organ. They have many more genes than our human genes…

Dr Saleyha Ahsan: wow

Dr Eran Elinav: …and they have great functional implications. Now what's really exciting about this field is that our human genome is really important, we know that it is important and it determines many aspects of our existence. However, our human genome is there when we are born and unfortunately we do not have the means to change it if something goes wrong. So if we have a mutation in a gene: we are born with it, we'll die with it and we have to deal with it. But in contrast, our microbial genome is as important as our human genome and, in contrast to our human genome, we have ways by which we can manipulate it and change it, and perhaps develop ways to lower disease risks by impacting our gut microbial composition function.

Dr Saleyha Ahsan: And how can you actually change your gut bacteria?

Dr Eran Elinav: So there's several ways - which are under intense research in our labs, and in other labs, which all are trying to do this. We all are trying to manipulate our gut microbial ecosystem in order to impact our health and our tendency for disease. We regard our gut microbes as, if you may, a hub that integrates into many signals, including our human genetics, our immune system, but also many environmental factors, such as the food we eat, stress, air pollution – you name it. Our gut microbes are taking all of these signals, integrating them and sending them as signals to the host. And this is how they impact the host. Now nutrition, of all of these factors, (in our hands and in other hands) is the strongest influencer of the composition and function of the gut microbes. So, if we can find – this is what we are suggesting here – a science-driven way to alter nutrition in a way that would make our gut

microbes become better for particular conditions we can improve human health through the changes imposed on the gut microbiome.

Dr Saleyha Ahsan: So, some of us might have gut microbes that might make us more predisposed to having diseases like diabetes. So, if we can find a way to change those gut microbes, it obviously lowers our risk of developing that disease. Is that what you are saying?

Dr Eran Elinav: Absolutely. Absolutely. And we find nutrition to be one of the most effective interventions in that regard.

Dr Saleyha Ahsan: So how long would a person have to stay on the 'intervention', y'know, avoiding a certain food group, if they knew that was spiking their blood sugar, or is it forever?

Dr Eran Elinav: So this is an excellent question. What we've so far done, we've intervened for a short period of time, for a week using the good diet and a week using the bad diet. And in as short as a week we could see dramatic differences developing in the gut microbes going in the predicted direction. Now what we are doing is performing a longer range study in which we are following people on their good diet for over a year. One integral part of the long-term study is to recheck the individuals that participate after a few months of adhering to their good diet and to recheck their microbiome to see whether the changes are consistent and, perhaps, some of the dietary modifications would need to be changed after a few months in order for the new microbiome configuration to remain stable and beneficial for that individual.

Dr Saleyha Ahsan: Okay.

Dr Eran Elinav: So whether we would adhere to the same diet forever, or we would have to periodically revisit the individuals and see which changes have occurred and to tweak the personalised diet accordingly is an open question which we are actively following these days.

Dr Saleyha Ahsan: What it shows is that there is still a lot that we don't know, and we're at the beginning. But it's a hugely exciting step forward.

Dr Eran Elinav: Absolutely, we are really feeling that we are just scraping the surface, because the microbiome is such an immense ecosystem. It is so poorly understood. There is so much data that we are extracting from it that there are many more years in which we will be kept busy.